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EXAMINER	
BELL, WILLIAM P	

ART UNIT	PAPER NUMBER
1791	

NOTIFICATION DATE	DELIVERY MODE
07/23/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mwzb.com

Office Action Summary	Application No.	Applicant(s)	
	10/553,284	SCHULZ ET AL.	
	Examiner	Art Unit	
	WILLIAM P. BELL	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 April 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 18-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16 and 18-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seiberle (International Patent Application Publication No. WO 01/29148, already of record) in view of D'Amato (U.S. Patent No. 5,071,597, already of record) and Nakano (Japan Patent Application Publication No. JP-05045503, already of record) for the reasons cited in the previous Office action. Regarding claim 1, Seiberle teaches a method for producing transparent optical elements (see page 1, lines 3-5, wherein optical devices are described which transmit light and therefore must be transparent to light), the surface of which has reduced interfacial reflection (see page 1, line 5, wherein anti-reflective coatings have reduced interfacial reflection) in which a surface of a reference element which consists of a polymeric material is provided with an irregular nanostructure (see page 4, lines 24-32); and subsequently, the surface is coated with an electrically conducting thin film (see page 12, lines 7-12, wherein Seiberle extends his method to provide for production of a molding master by first coating the nanostructured element with a layer of aluminum). Seiberle does not teach two important aspects of the claimed invention -- first, the specific claimed steps of forming

a mold and replicating the reference element and, second, producing the reference element via an ion bombardment process. As to the steps of forming a mold and replicating the reference element, Seiberle suggests but does not explicitly state that a mold with a negative contour which is superposed by the nanostructure is obtained, and with such a mold, a nanostructure reducing the interfacial reflection is formed on at least one surface of a transparent optical element by a molding process (see page 12, lines 7-12, wherein Seiberle teaches the use of the nanostructured film as a master for making replicas of the reference element). In the analogous art of reproducing very small scale surface patterns on molding objects, D'Amato teaches a method wherein a microstructural pattern is formed on a reference element (see column 2, lines 6-10), a layer of electrically conductive metal is coated onto the element (see column 2, lines 22-24), a mold is formed with a negative contour of the original element (see column 2, lines 27-30), and the microstructural pattern is replicated onto the surface of objects obtained by a molding process from said mold (see column 2, lines 30-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to have supplemented the method taught by Seiberle with the more explicit steps taught by D'Amato for the benefit of producing multiple optical elements from a single master reference element. In addition, one of ordinary skill in the art would have had a high expectation of success from such a method based on Seiberle's teaching that nanostructured masters can be thus obtained. As to the ion bombardment process, Seiberle teaches a method wherein a nanostructural pattern is formed in a coating that is applied to the reference element, but does not teach that the nanostructural pattern

on the reference element is formed by exposing the reference element to the influence of high-energy ions in a vacuum. In the analogous art of forming anti-reflective surfaces on optical elements, Nakano teaches a method wherein a polymeric reference element (see [0047]) is exposed to the influence of high-energy ions in a vacuum for the production of an anti-reflective surface (see [0048]). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method of forming the anti-reflective structure as taught by Seiberle, and modified by D'Amato, with the method taught by Nakano for the benefit of eliminating the need for and cost of applying a coating to the optical element.

Regarding claim 2, Seiberle teaches a method characterized in that a reference element with an optically effective surface contour is used (see Example 1 on page 14, line 26 through page 16, line 5, as well as Figure 2-a, wherein an optical element is produced which has a surface contour which is effective in reducing the refractive index (an optical property) of the element).

Regarding claim 3, Nakano teaches a method characterized in that the high-energy ions are generated by means of an argon/oxygen plasma (see [0029]) wherein the argon/oxygen mixture prolongs the life of the ion generation filament (see [0029]). It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the method taught by Seiberle with the method of Nakano further using an argon/oxygen plasma for the benefit of prolonging the life of the ion generation equipment.

Regarding claim 4, Nakano teaches a method characterized in that polymethylmethacrylate, diethylene glycol bis(allylcarbonate) (CR39) or methylmethacrylate-containing polymers are used for the production of the reference element (see [0047]). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Seiberle with the method of Nakano further using the recited polymers, since these are the most common polymers used in optical applications.

Regarding claim 5, Seiberle teaches a method characterized in that the elevations of the nanostructure are formed with height in the range between 30 nm and 210 nm (see page 12, lines 27-30, wherein the height of the pores corresponds to the height of the elevations).

Regarding claim 6, Seiberle teaches a method characterized in that the average thicknesses of the elevations of the nanostructure are formed in the range between 30 nm and 150 nm (see page 12, lines 31-32 and Figure 1c, wherein the diameter/thickness of the elevations can be seen as approximately equal to that of the depressions, which is 100 nm).

Regarding claim 7, D'Amato teaches a method characterized in that the electrically conducting layer is formed as a thin metal film (see column 2, lines 22-27). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Seiberle with the method of D'Amato further including a thin metal film, because metals are known to accurately reproduce detailed surface structures in coating applications (see column 6, lines 54-55)..

Regarding claim 10, Nakano teaches a method characterized in that an ion bombardment of the surface is carried out over a time period of between 200 s and 600 s (see [0047]). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Seiberle with the method of Nakano further modified with the recited time period for the benefit of optimizing the depth of the nanostructure formed in the reference element (see [0032]-[0033], wherein Nakano discusses optimizing exposure time and ion current density to achieve the desired results).

Regarding claim 11, Nakano teaches a method characterized in that an ion bombardment is carried out at a pressure below 10-3 mbar (see [0047], wherein 1 x 10-5 Torr = 1.33 x 10-5 mbar). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Seiberle with the method of Nakano further modified with the recited vacuum level for the benefit of minimizing contamination of the reference element.

Regarding claim 12, D'Amato teaches a method characterized in that molding of the optical elements takes place by hot embossing or by a plastics injection molding technique (see column 8, lines 11-18 and item 90 in Figure 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Seiberle with the method of D'Amato further modified with hot embossing for the benefit of inexpensively mass producing optical elements on molded objects.

Regarding claim 13, D'Amato teaches a method characterized in that the molding of the optical elements takes place by extrusion embossing or UV replication (see the Abstract, wherein blow molding is taught as a method for forming the optical elements; the blow molding process consists of pressing a tube of molten polymer against a mold surface and therefore can be broadly interpreted as a method of extrusion embossing). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Seiberle with the method of D'Amato further modified with hot embossing for the benefit of inexpensively mass producing optical elements on blow molded objects

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Seiberle, D'Amato, and Nakano as applied to claim 7 above, and further in view of Piccard (U.S. Patent No. 2,649,622, already of record) for the reasons cited in the previous Office action. None of the previously cited references teach the use of a gold electrically conductive layer in the formation of a mold from a nanostructured reference element. However, the use of gold is well known in the art of electroforming of molds. For example, Piccard teaches the use of a gold layer for the formation of stampers for the production of phonograph records (see column 1, lines 29-32). It would have been obvious to one of ordinary skill in that art at the time of the invention to have modified the method taught by Seiberle, D'Amato, and Nakano with a gold layer as taught by Piccard for the benefit of providing a layer which is well known to replicate detailed structures properly.

4. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Seiberle, D'Amato, and Nakano as applied to claim 1 above, and further in view of Kaufman (U.S. Patent No. 6,608,431, hereinafter the '431 patent) and Kaufman (U.S. Patent 4,862,032, hereinafter the '032 patent). Nakano does not explicitly state the energy level of the ions employed in his method. However, he does state that he uses a Mark II ion source (see [0047) and that the voltage of the ion source affects the homogeneity of the formed surface. The Kaufman '431 patent discloses that the Mark II ion source is based on the Kaufman '032 patent, with some minor modifications which would not affect the energy level of the ions generated by the device (see column 3, lines 54-65). The Kaufman '032 patent discloses typical energy levels of the ions generated in the range of 100 to 160 eV. It would have been obvious to one of ordinary skill in the art at the time of the invention to have operated the vacuum ion chamber taught by Nakano within the nominal range of the device and to have determined a suitable range for the energy level based on simple experimentation.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Seiberle, D'Amato, and Nakano as applied to claim 1 above, and further in view of Bier (U.S. Patent No. 5,849,414, already of record) for the reasons cited in the previous Office action. Seiberle teaches that the nanostructured films of his invention can be coated with various materials to manipulate the topological or optical properties of the films, but does not explicitly recite the use of organic-inorganic hybrid polymers. However, the use of such materials as scratch resistant coatings on polymeric articles is well known. For example, Bier teaches a method of applying an organic-inorganic

hybrid polymer (ORMOCER®) onto polycarbonate parts (see column 10, lines 17-30). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method taught by Seiberle, D'Amato, and Nakano with the scratch resistant coating taught by Bier for the benefit of protecting the delicate nanostructure formed on the element.

6. Claims 15, 16, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over. Regarding claim 15, Seiberle teaches a mold for producing optical elements (see page 12, lines 7-12, wherein a master mold for producing replicas of optical elements comprising nanostructures is taught) characterized in that an irregular nanostructure with alternately arranged elevations and depressions lying in between is formed on a surface (see Figure 1a, wherein a structure of alternating elevations and depressions is shown), and the depression in each case have different depths within an interval between 30 nm and 210 nm (see page 12, lines 27-32). The steps of the process in claim 1 do not impart any structure beyond what is explicitly recited in claim 15, all of which is taught by Seiberle. If there is any difference, the difference would have been minor or obvious. In Figures 1a-1c, Seiberle teaches nanostructures wherein the depths and thickness of the depressions appear to have a normal distribution about a mean value, but does not specifically recite any data which shows such a distribution. However, it would have been obvious to one of ordinary skill in that art at the time of the invention that a normal distribution of depression dimensions would be desirable in order to eliminate any non-uniformity in the effect of the anti-reflection reduction. Further, it is noted that Seiberle teaches that the two materials which are

used to form the optical surface are “molecularly well mixed” (see page 3, lines 7-10), that a normal UV light is used to crosslink one of the two materials (see page 2, lines 17-18), and that a single (i.e., uniform) solvent is used to extract the other material (see page 2, lines 20-22 and, as an example, page 15, lines 19-20). Each of these factors serves to produce a uniform structure, and Seiberle also teaches other ways of enhancing the uniformity of the structure (see page 3, lines 12-20). Such uniformity would be expected to result in a normal distribution of structure sizes.

Regarding claim 16, Seiberle teaches a mold characterized in that the depressions have an average clear width in the range between 30 nm and 150 nm (see Figure 1a and page 12, lines 27-32).

Regarding claim 19, Seiberle teaches a mold characterized in that it is formed for the production of optical windows, optical lenses, lenticular lenses, beam splitters, optical waveguides or optical prisms (see page 10, lines 18-20, wherein diffusers and reflectors are types of optical lenses in that they shape light which passes through them).

Regarding claim 20, Seiberle teaches a mold characterized in that it is formed for the production of optically transparent films (see page 4, lines 24-32).

Regarding claim 21, Seiberle teaches a mold characterized in that it is formed for the production of coverings for displays or for optical indicating elements (see page 6, lines 19-26).

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seiberle as applied to claim 15 above, and further in view of Levy (U.S. Patent No. 5,541,762,

already of record). Seiberle teaches the application of his invention in a variety of optical applications, including those in which grooves are formed in the element (see page 11, lines 1-10), but does not explicitly recite Fresnel lenses as one of those applications. In the analogous art of antiglare optics, Levy teaches the use of antiglare masks in Fresnel lenses (see column 6, lines 7-8). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the mold taught by Seiberle to a Fresnel lens as taught by Levy for the benefit of reducing glare/reflection in such applications

Response to Arguments

8. Applicant’s arguments, see page 9, filed 22 April 2009, with respect to the abstract and the specification have been fully considered and are persuasive. The objection of 22 December 2008 has been withdrawn.

9. Applicant's arguments with respect to claims 15, 16, and 19-21 have been considered but are moot in view of the new ground(s) of rejection.

10. Applicant's arguments filed 22 April 2009 have been fully considered but they are not persuasive. Regarding claim 17, now incorporated in claim 15, Applicant argues that the technique taught by Seiberle does not suggest that the size of the pores formed can be controlled to the extent that a uniform size distribution about a mean value within an interval is achievable. As discussed above in the rejection of amended claim 15, Seiberle is concerned with uniformity of the two-component film and the resulting structure, preferring that the two components have similar chemical structures so that a

molecularly well mixed solution can be achieved. Seiberle also teaches additional steps which further enhance the homogeneity of the film and structure. These teachings suggest that uniformity of the film and structure is desirable and that a uniform pore size distribution about a mean value within an interval can be achieved with the method.

Regarding claim 18, Applicant argues that the rejection fails to explain why one would modify the anti-reflective coating or optical diffuser film of Seiberle to function as a Fresnel lens or how the modification would reduce glare. Levy teaches the structure of a Fresnel lens, a well known optical element. Seiberle teaches a mold for producing optical elements with anti-glare functionality which can be formed in a grooved structure analogous to the grooved structure of a Fresnel lens. Since Seiberle teaches that antiglare functionality is desirable in optical elements, one of skill in the art would have been motivated to combine Seiberle and Levy to produce a well known optical element with a desirable antiglare functionality. Seiberle teaches a method in which a grooved structure can be formed in the mold surface and it would have been within the ability of one of ordinary skill in the art at the time of the invention to have adapted that method to the production of a Fresnel lens.

Regarding claims 1-7 and 10-13, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In response to applicant's argument that D'Amato is nonanalogous art, it has been held that a prior art reference must either be in the field of

applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, D'Amato and Seiberle are both directed to applicant's field of endeavor, the production of optical elements with small scale structures. Further, Seiberle suggests the application of the method to the production of a master mold, but does not provide details on how to produce such a mold. One of skill in the art would logically look to the art of making such molds, which would include D'Amato.

Regarding claim 8, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Regarding claim 14, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

11. Applicant's arguments, see page 14, filed 22 April 2009, with respect to the rejection(s) of claim(s) 9 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of prior art by Kaufman.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM P. BELL whose telephone number is (571)270-7067. The examiner can normally be reached on Monday - Thursday, 8:00 am - 5:30 pm; Alternating Fridays, 8:00 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on 571-272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Wpb

/Richard Crispino/
Supervisory Patent Examiner, Art Unit 1791